

**TITLE**

**FOLDING KNIFE LIGHT TOOL**

**CLAIM OF PRIORITY**

**[0001]** This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my provisional application *SINGLE BODY MULTI-TOOL DEVICE* filed with the U.S. Patent & Trademark Office on the 3<sup>rd</sup> of March 2003 and there duly assigned Serial No. 60/451,544.

**BACKGROUND OF THE INVENTION**

**Technical Field**

**[0002]** The present invention relates generally to folding knives and processes for manufacturing knives, and more specifically to a folding knife incorporating a source of selectively operable illumination.

**Related Art**

**[0003]** Many different types of folding knives are available. Exemplary knives provided with lighting fixtures may be found in such references as U.S. Patent No. 4,364,104 to Holahan *et al.*, entitled *NOVELTY LIGHT*, issued on December 14, 1982; U.S. Patent No. 5,313,376 to McIntosh, entitled *MULTIPURPOSE KNIFE/LIGHT*, issued on May 17, 1994; U.S. Patent No. 5,467,256 to Chen, entitled *KNIFE WITH LIGHTING FIXTURE*, issued on November 14, 1995; U.S. Patent

1 No. 5,727,319 to Myerchin *et al.*, entitled *KNIFE WITH ILLUMINATED BLADE*, issued on March  
2 17, 1998; U.S. Patent No. 4,751,621 to Jenkins, entitled *LIGHT KNIFE*, issued on June 14, 1988;  
3 U.S. Patent No. 6,434,829 to Chen, entitled *KNIFE HAVING A WARNING STRUCTURE*, issued  
4 on August 20, 2002; and U.S. Patent No. 5,474,452 to Campagnuolo, entitled *TRAINING*  
5 *SIMULATION SYSTEM FOR INDIRECT FIRE WEAPONS SUCH AS MORTARS AND*  
6 *ARTILLERY*, issued on December 12, 1995. Some of these knives provide light when a button is  
7 pressed, or when the blade is folded open. No knife is currently available that allows the user to  
8 choose to operate the flashlight with the knife unfolded, with the knife folded or for automatic  
9 illumination when the knife is unfolded.

## 10 SUMMARY OF THE INVENTION

11 **[0004]** It is therefore, one object of the present invention is to provide a knife and a process for  
12 manufacturing knives equipped with a source of selectively operable illumination.

13 **[0005]** It is another object to provide a knife and a process of manufacturing knives with an  
14 illumination component that gives the user a choice of operation of the knife with or without  
15 illumination.

16 **[0006]** It is another object to provide a knife and a process for manufacturing knives with the  
17 capability to operate an illumination component momentarily.

1     **[0007]**   It is still another object to provide a tool and a process for manufacturing tools equipped  
2     with a tool port accommodating any of a number of tools within the housing of the tool.

3     **[0008]**   It is yet another object to provide a tool and a process of manufacturing tools  
4     incorporating a mode switch that allows the user to switch between three modes of operation: OFF,  
5     ON, and ON-BY-BLADE.

6     **[0009]**   It is still yet another object to provide a tool and a process of manufacturing tools  
7     endowed with an ability to enable a user to locate the knife in the dark, if desired.

8     **[0010]**   It is a further object to provide a knife and a process of manufacturing knives that enables  
9     the knives to incorporate features that can be utilized in all sizes of knives, from small penknives  
10    to large buck-skinning knives.

11    **[0011]**   It is yet a further object to provide a knife and a process of manufacturing knives  
12    equipped with a selectively operable source of illumination that can be used with knives that are  
13    non-locking, linear-locking, or lock-back locking.

14    **[0012]**   It is still a further object to selectively provide illumination for use of a tool carried in  
15    the tool port of this invention when operated or when used in the dark.

1     **[0013]**   It is still yet a further object to provide an armed forces training tool and process for  
2     manufacturing the tool by providing an illumination signal that could be utilized as a kill score  
3     during commando training.

4     **[0014]**   It is also an object to selectively provide illumination for critical procedures as desired  
5     by utilizing the on feature for emergencies such as medical operations.

6     **[0015]**   It is also an object to provide a folding knife light tool and process of manufacturing a  
7     tool with an ergonomic handle in which a source of illumination such as an LED or light bulb  
8     or a laser light is incorporated into the handle housing in the spaces existing between the blade,  
9     the locking mechanism, and the handle.

10    **[0016]**   In accordance with the principles of the present invention, a knife's handle may be  
11    configured with a body contoured for the hand. The housing is made from one molded piece with  
12    a slit in the middle. The handle includes a pivot point for supporting a blade between the  
13    longitudinal sides or scales of the blades. A conventional locking, or alternatively, a non-locking  
14    system may be used to keep the knife open once the blade has been unfolded from the handle.  
15    When the blade of the knife is folded into the handle, a portion of the blade can extend above the  
16    sides of the handle for digital engagement in the opening operation.

17    **[0017]**   A source of illumination or light is attached to the folding knife housing which includes

1 the handle. In one embodiment, the source of illumination such as one or more lights may be fitted  
2 into each side of the opened knife to illuminate both sides of the blade and the area near the tip of  
3 the blade. In another embodiment, a source of illumination may be provided only on one side of  
4 the blade when the blade is opened. An exposed convex magnifying lens may also be mounted  
5 flush with the housing of the folding knife.

6 **[0018]** A reflector may be positioned behind the lens and the source of light for maximum,  
7 concentration of light output.

8 **[0019]** A three position waterproof slide switch may be provided as a mode switch and may be  
9 located at the back of the handle of the folding knife in order to provide three modes of operation;  
10 OFF, ON, and On-by-blade. A momentary on switch in a microswitch configuration may be  
11 provided and placed near the heel of the blade so that when the blade is in an opened position, the  
12 light is activated, or toggled on. Additionally, the momentary on switch can be switched to an on  
13 position by manual manipulation with either the thumb or finger of the user when the blade is in  
14 a closed position and the mode switch is in the ON-by-blade position. Such a momentary switch  
15 may be used to momentarily turn off the source of illumination when the blade is in the opened  
16 position by using a momentary switch configured with another position for electrically coupling  
17 a battery to the source of illumination. Also, a dimming position may be added to the momentary  
18 switch in another embodiment. A further feature of switching to another color of illumination can  
19 be provided by using different sources of illumination, whether LED's or filtered sources of

1 illumination, emitting different wavelengths. This feature may be activated by utilizing a version  
2 of a momentary switch which incorporates additional switching positions.

3 **[0020]** A waterproof battery compartment may be provided to house miniature batteries within  
4 the housing, or within the handle of the knife. Any battery or voltage configuration can be used.  
5 Also, any portable power source that can be accommodated by the handle can be used. One  
6 embodiment may use the newly available AAAA size battery. The power source or batteries may  
7 be removable or alternatively, rechargeable, or a solar powered series of cells, or a solar charged  
8 battery. The battery compartment could also be fitted with a screw-on waterproof cap type of  
9 cover.

#### 10 **BRIEF DESCRIPTION OF THE DRAWINGS**

11 **[0021]** A more complete appreciation of the invention, and many of the attendant advantages  
12 thereof, will be readily apparent as the same becomes better understood by reference to the  
13 following detailed description when considered in conjunction with the accompanying drawings,  
14 in which like reference numerals indicate the same or similar components, and wherein:

15 **[0022]** Fig. 1 is a view of the folding knife light tool in a closed position.

16 **[0023]** Figs. 2, 2A and 2B are views of the knife blade switch parts of one embodiment.

17 **[0024]** Figs. 3 and 3A are views of the knife blade switch parts showing the second embodiment  
18 of the invention.

19 **[0025]** Fig. 4 is a schematic electrical diagram of the folding knife light switches.

1     **[0026]**    Figs. 5, 5A and 5B are views of the folding knife light tool in the open position and  
2     closed position.

3     **[0027]**    Fig. 6 is a view of the folding knife light tool showing a push button switch that can be  
4     switched on by a user or by the knife blade in the open position.

5     **[0028]**    Fig. 7 is a view of the knife blade accommodating an operating magnet and a magnetic  
6     reed switch as the first electrical or toggle on switch.

7     **[0029]**    Fig. 8 is a view of a block diagram of the folding knife light tool in an embodiment for  
8     Armed Forces use (Military Model) which includes an on-by-blade sonic alarm and a laser light  
9     package for use with the Army's MILES training system.

## 10                    **DETAILED DESCRIPTION OF THE INVENTION**

11     **[0030]**    With reference to **FIG.1**, the folding knife flashlight tool is shown in one embodiment  
12     in a folded position. The illuminating component **100**, housing component **200**, and the blade-  
13     switch component **300** comprise the three major components of this embodiment. A illuminator  
14     **104** is located behind a lens **102** and in front of a reflector.**103** at the pivot axis **204** end of the  
15     housing **200**. The housing **200** has an ergonomic shape for comfort in usage. The lens **102** can  
16     be of a focusing type which is adjustable by any of the adjusting means available in the trade. In  
17     another embodiment illustrated by **FIG. 5A**, a lens **102** is provided on both sides of the extended  
18     blade **302** wherein both sides of the blade **302** are illuminated

1     **[0031]** Referring to **FIGs. 1 and 4**, a three position waterproof mode switch **301** is positioned  
2     at the end of the housing **200** opposite of the light end. Three modes of operation are provided:  
3     OFF, ON, and ON-by-blade. In an embodiment of this invention illustrated by **FIG. 6**, a  
4     momentary-on switch **304** is provided and positioned at the pivot axis end of the housing **200** and  
5     near a heel of the knife blade **303** so that when the blade **302** is opened the heel portion **303** of the  
6     knife blade **302** contacts and acts as a mechanical lever, with heel portion **303** camming, and thus  
7     operationally moving the contact wiper of switch **304**, and thereby switches the momentary on  
8     switch **304** into its electrical ON position, thus electrically coupling a source of electrical power  
9     such as drycell penlight battery **105** across the filament of light bulb **104**. This switch **304** will also  
10    allow illumination to be used for SOS or other types of distress situations.

11           Referring to **FIGs. 2, 2A, 2B, 3, and 3A** another embodiment utilizes a contact washer **306**  
12    and a pressure contact **309** on said washer **306** to establish electrical contact to the mode switch  
13    **301** and thereby switch the illumination component **100** when conductive plate **312** contacts  
14    contact stud contact **313** on the housing **200**. Also another embodiment allows a semicircular  
15    contact washer **311** to establish contact with the mode switch **301** and switch on the illuminating  
16    component **100**, when the blade **302** is opened and semicircular contact washer **311** contacts the  
17    two contact studs **308** accommodated into the housing **200** thereby making a circuit and sending  
18    power to switch **301**. Another switch embodiment involves a switch magnet **110** and a magnetic  
19    reed switch **108**, referring to **FIG. 7**, wherein switching of the switch magnet **110** by the heel **303**  
20    of the blade **302** as the blade is unfolded to the open position places the switch magnet close to the



1 magnetic reed switch **108** which is then switched on thereby turning on the illuminating  
2 component **100**.

3 **[0032]** Referring to **FIGS. 5, 5B**, and **FIG. 1** a waterproof battery **105** compartment **107** is  
4 provided. Any of several high density batteries available in the commercial market can be used  
5 including lithium, alkaline, and the new miniature fuel cells. AAAA batteries newly available are  
6 easily packaged within the confines of the housing **200** together with the spring locking  
7 mechanisms, a tool port, and an accessory tool **206** accommodated in the tool port **205**.

8 **[0033]** In another embodiment of the invention, the momentary on switch **304** and the mode  
9 switch **301** are collocated at the battery compartment **107** end of the housing. This collocated  
10 switch **116** combines the functions of both of these switches. The momentary on switch is  
11 switched on however by the forward part of the knife blade **302** as the knife blade **302** closes and  
12 presses against a cam type actuator **120**, or in another embodiment, comes in between a switching  
13 magnet and a magnetic reed switch thereby cooperating with said magnet and magnetic reed switch  
14 to switch off said magnetic reed switch. In this embodiment a magnetic steel including magnetic  
15 stainless steels would be used for the blade **302**. This actuator **120** can also be switched on by a  
16 thumb switch **114**, whether the blade is folded open or closed.

17 **[0034]** In a military embodiment of the invention **FIG.8** several packages are added and the  
18 housing **200** is modified to accommodate the features added. A sonic alarm package **214** that

1 cooperates with the US Army's MILEs training is switched on at the same time as the illumination  
2 component **100**. The Sonic package **214** is powered by one or more dry cell batteries installed  
3 within battery compartment **107**. A laser package **112** and an RF package **118** that are also MILEs  
4 compatible can also be incorporated. These added packages; sonic **214**, laser **112**, and RF **118**  
5 are all powered by the batteries in the battery compartment **107**. US Patent No. 5,474,452 issued  
6 to Campagnuolo and assigned to the US Government, as represented by the Secretary of the Army,  
7 is incorporated herein for information about the MILEs system. Basically the laser, sonic, and RF  
8 packages when received by devices carried on a harness worn by a soldier during training register  
9 as "hits" and/or "kills" and assist in scoring the capabilities of units in training. Another version  
10 of the military model would be an actual offensive type weapon carried by special forces and would  
11 include a quick-release mechanism for the blade **302**. A quick-release button **210** on this  
12 commando model would allow one handed operation of the invention for combat purposes. In the  
13 weapon model, the quick-release button must be depressed to unlock the blade **302** so to fold the  
14 blade **302** back into the housing **200**. Additionally the MILEs packages **112**, **214**, and **118** are not  
15 necessary except for training, and need not be included in the commando model. In a further  
16 development, a medical model is embodied in a design comprising a quick release mechanism and  
17 an illumination feature for used by surgeons who need to open knives with one hand during  
18 combat medical procedures.

19 **[0035]** A unique feature of the invention is the three way mode switch installed during  
20 manufacture of the tool by incorporating the mode switch to allow the user to manually switch

1 between three modes of operation: and electrically OFF state where no electrical energy from the  
2 batteries is supplied to the source of illumination, an electrical ON state where the electrical energy  
3 from the batteries is applied to the source of illumination (*e.g.*, across the filament of a light bulb  
4 or across the semiconductor junction of a light emitting diode), and an electrical ON-BY-BLADE  
5 state where the state of the mode switch enables the movement of the blade, or other tool, from  
6 storage within the handle of the housing to a deployed and functionally operable position, for  
7 example, with the blade of a knife extending distally outwardly from the handle, or the tip of a  
8 screwdriver extending distally outwardly from the handle to engage the heads of threaded  
9 fasteners. The mode switch provides the capability to turn the light on without the knife being  
10 opened. The mode switch also provides the feature of being able to open the knife without any  
11 light coming on. By leaving the knife mode switch in the on-by-blade position, the light goes on  
12 and off by opening and closing the blade without ever having to touch a switch.

13 **[0036]** A tool port is provided for attaching an accessory tool or tools to the knife housing. The  
14 tools attached can be one or two of a variety available in multiuse tool knives today, for example:  
15 tweezers, scissors, razors, scalpels, picks, forks, spoons, and especially a standard hexagon driver  
16 tool. A variety of other common and uncommon tools can be utilized depending upon the specific  
17 need.

18 **[0037]** In one embodiment of the invention, the actual heel of the blade is provisioned with a  
19 contact washer that cooperates with a contact stud in the handle housing to complete an electrical

1 circuit when the blade is in an open position, a contact plate fixed to the blade makes contact with  
2 another contact stud in the handle and thereby turns on the light or illumination by its' switch  
3 action. In a related embodiment the heel of the blade is provisioned with a semi-circular  
4 conductive washer around the pivot point whereby when the blade is in an open position, two  
5 barbed contact studs attached to the housing handle contact the conductive semicircle and  
6 complete an electrical circuit to switch on the light, when the blade is in a closed or folded  
7 position, the two barbed contact studs rest on a non-conductive washer located under the semi-  
8 circular conductive washer. The blade itself can be the conductive switch part which turns the  
9 light on when the blade is opened. This switching could be accomplished by incorporating all of  
10 the features on a wiring board or printed circuit board or other available electronic packaging  
11 means.

12 **[0038]** In a further embodiment of the invention the momentary on switch and the three way mode  
13 switch, are provided as one switch assembly at the battery supply end of the knife housing wherein  
14 the switch assembly performs the same function as the two separate switches. The momentary on  
15 switch is switched however by the forward end of the blade as it comes to a closed position and  
16 switches off the momentary on switch. Both the two switch embodiment and the combined switch  
17 embodiment contain a momentary on button for the thumb or finger of the user to be able to  
18 switch ON the light when the blade is in a closed position...The thumb switch buttons are able to  
19 switch on the light or switch off the light, in the ON-by-blade position of the three way position  
20 switch. In addition, the thumb switch buttons can dim and or switch in another color of

1 illumination by switching to different LED's for example. Dimming would be accomplished by  
2 switching in a resistor or other passive or active electronic component standard in the industry.

3 **[0039]** In another embodiment of the folding knife light tool called the military model, a sonic  
4 package to cooperate with a MILE's training system is incorporated. The sonic package emits an  
5 acoustic signature compatible with the MILE's system to indicate a hit or a "kill" on the MILE's  
6 device worn by a soldier in training. In addition an RF package can be added to communicate with  
7 another version of the MILE's system. Also a laser light package can be installed on the folding  
8 knife to register a hit or kill on the wearer of a MILE's harness. The sonic, RF, and Laser packages  
9 are all controlled by the toggle switch of the folding knife. The housing of the military model is  
10 more elongate and of a larger diameter to handle the extra functions, all of which do not need to  
11 be present at the same time, that is, some models may only have the sonic package, etc. A training  
12 version of the military model can be provisioned without a blade or with a rubber blade for training  
13 purposes, especially with a quick release opening mechanism. The military model can also be  
14 used as a commando knife with all of the features of the folding knife and with one embodiment  
15 having the switchblade mechanism and a switchblade pushbutton to suddenly release the blade to  
16 an open position thereby startling an enemy. The elongated handle in this embodiment has a  
17 hammer feature at the blade end that can be useful in hand to hand combat, especially with the  
18 knife blade extended. This model would only be available as an issued weapon to combatants or  
19 to trainees as a training version. Reference is made to U.S. Patent No. 5,474,452 issued to  
20 Campagnuolo and assigned to the US Government, as represented by the Secretary of the Army,

1 for information about the MILE's system. In the weapon model, the pushbutton switch must be  
2 pushed to release the knife blade which is locked open so that the blade can be folded back into  
3 the handle. This action also turns off the laser light, sonic alarm system, a first illumination  
4 component, and the laser and a radio frequency (*i.e.*, RF) packages if installed. Turning the three  
5 way mode switch to the OFF position also opens, that is, turns off the application of electrical  
6 power to all systems.

7 **[0040]** Although preferred embodiments of the present invention have been described, it will  
8 be understood by those skilled in the art that the present invention should not be limited to the  
9 described preferred embodiments. Rather, various changes and modifications can be made within  
10 the spirit and scope of the present invention, as defined by the following claims.